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DeCarlo, Jr. et al.

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[54] **LONG BONE REAMER WITH DEPTH STOP INDICATOR**

[75] Inventors: **Alfred F. DeCarlo, Jr.**, Stamford, Conn.; **Patricia Katzman**, Arlington, Mass.

[73] Assignee: **DePuy Orthopaedics, Inc.**, Warsaw, Ind.

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[51] **Int. Cl.**[7] **A61B 17/58**

[52] **U.S. Cl.** **606/80**; 606/96; 408/202; 408/203

[58] **Field of Search** ..... 606/79, 80, 85, 606/86, 96; 408/202, 203, 241 S

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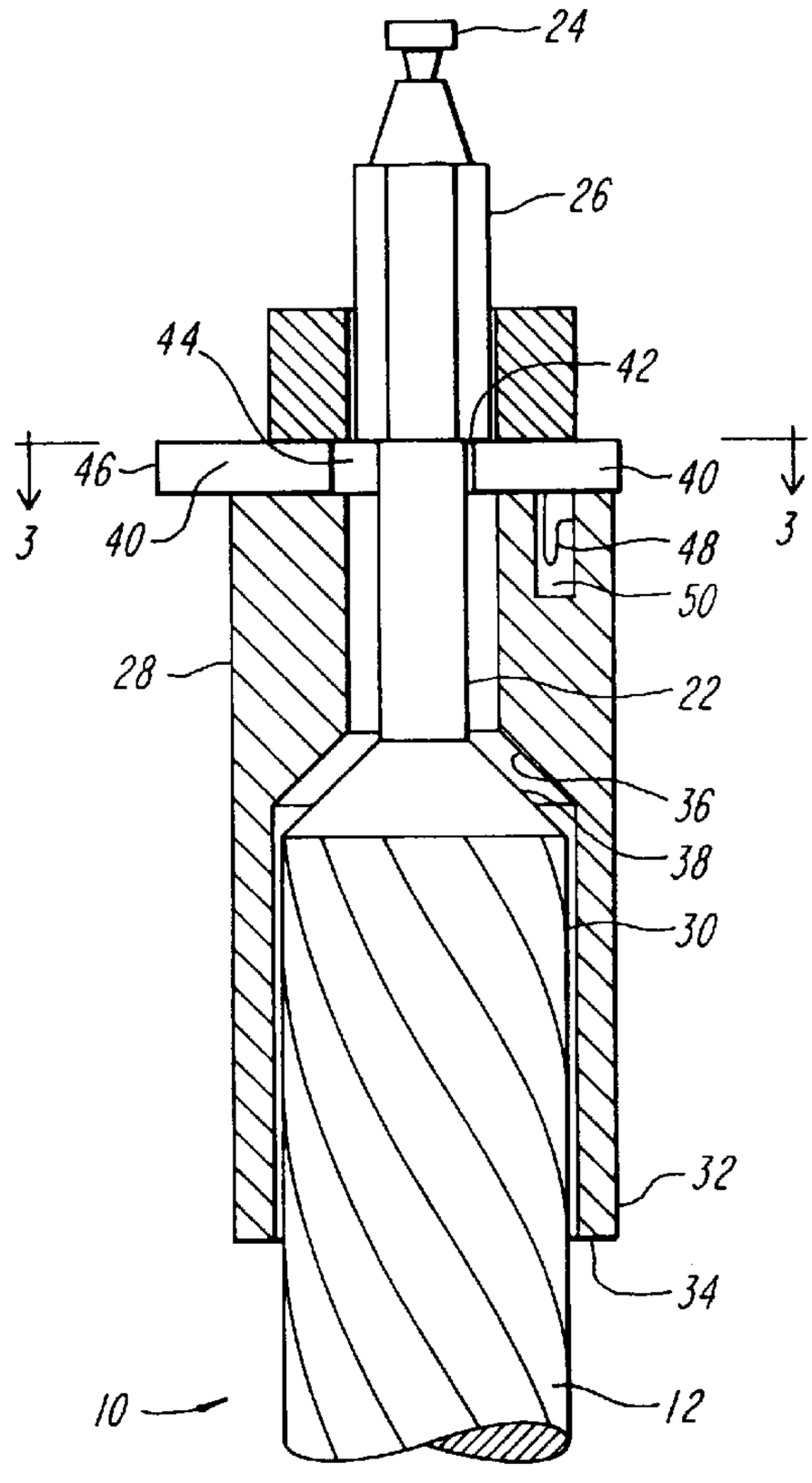
Primary Examiner—Michael Buiz
Assistant Examiner—Julian W. Woo
Attorney, Agent, or Firm—Nutter, McClennen & Fish, LLP

[57] **ABSTRACT**

The present invention provides an orthopaedic instrument system and method for reaming a long bone to a predetermined depth. The instrument system includes an elongate reamer having a proximal portion and a bone contacting surface with an integral cutting element. A stop indicating sleeve having an axial bore and a stop indicating element is removably disposed about the reamer. The stop indicating sleeve may be provided with a stop element and a distal bone contacting surface. Reaming beyond the predetermined reaming depth forces the stop indicating sleeve proximally and urges the stop element on the sleeve into engagement with a stop engaging element provided on the reamer.

40 Claims, 4 Drawing Sheets



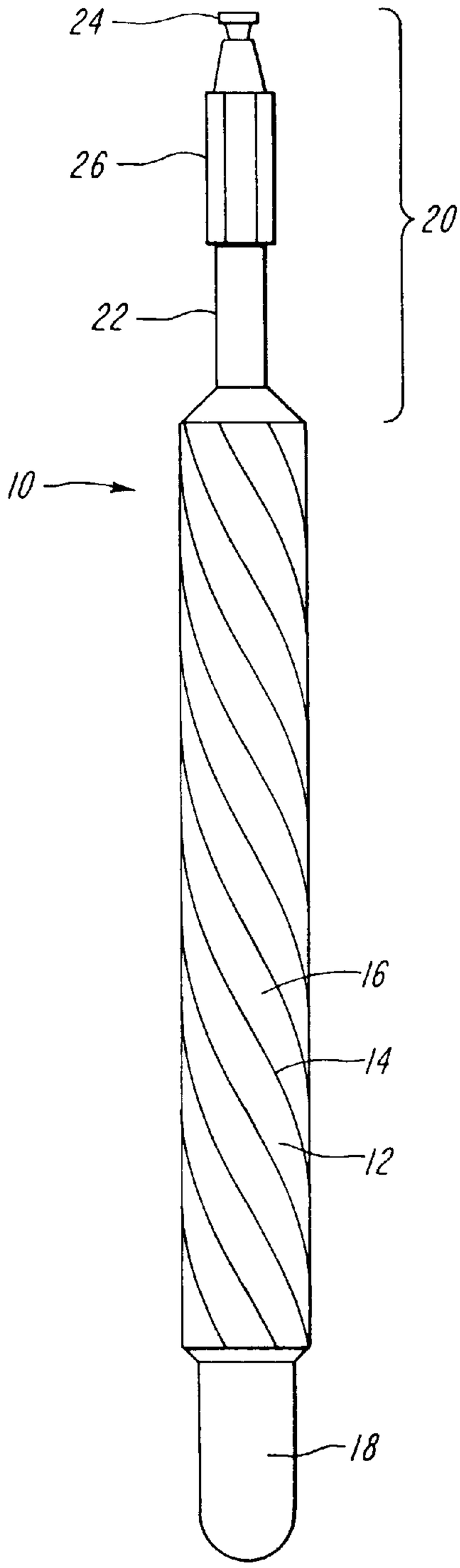

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FIG. 1

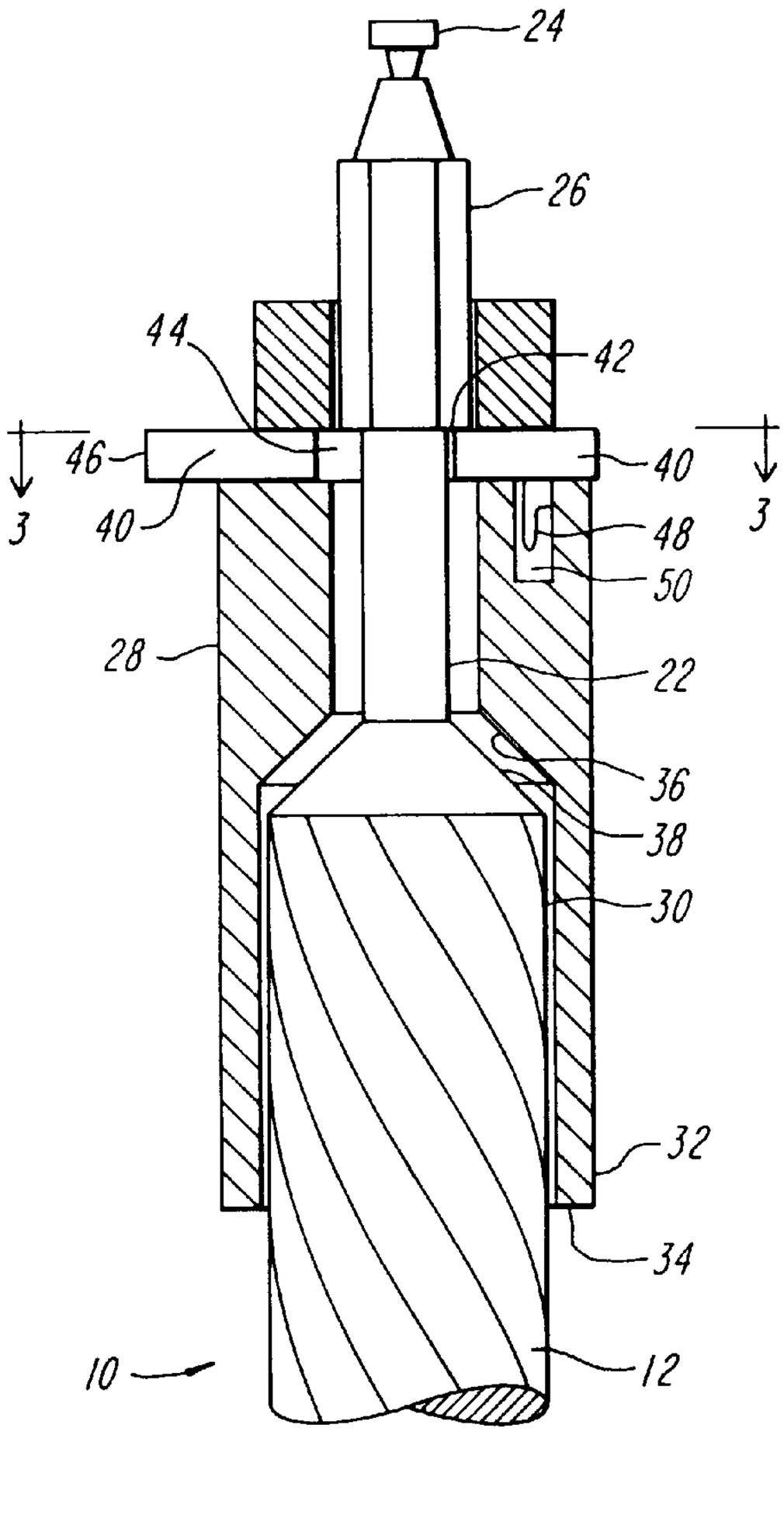
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FIG. 2

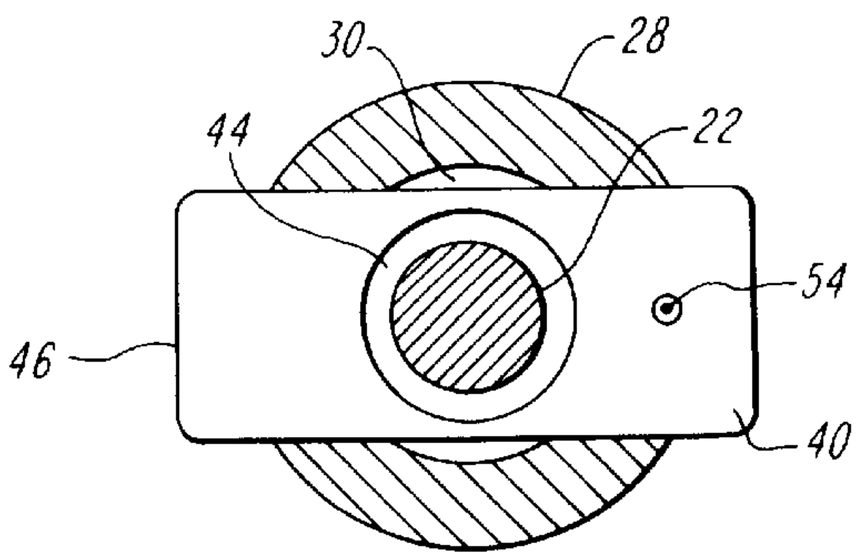

FIG. 3A

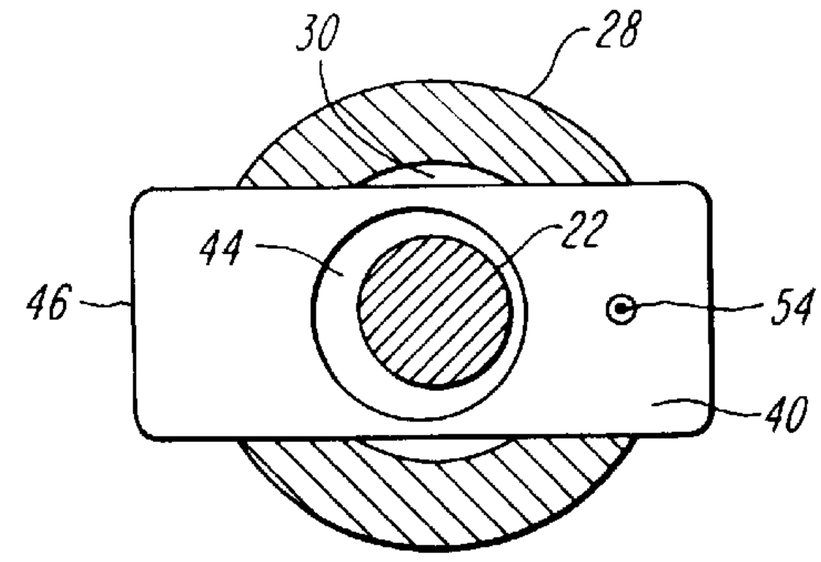

FIG. 3B

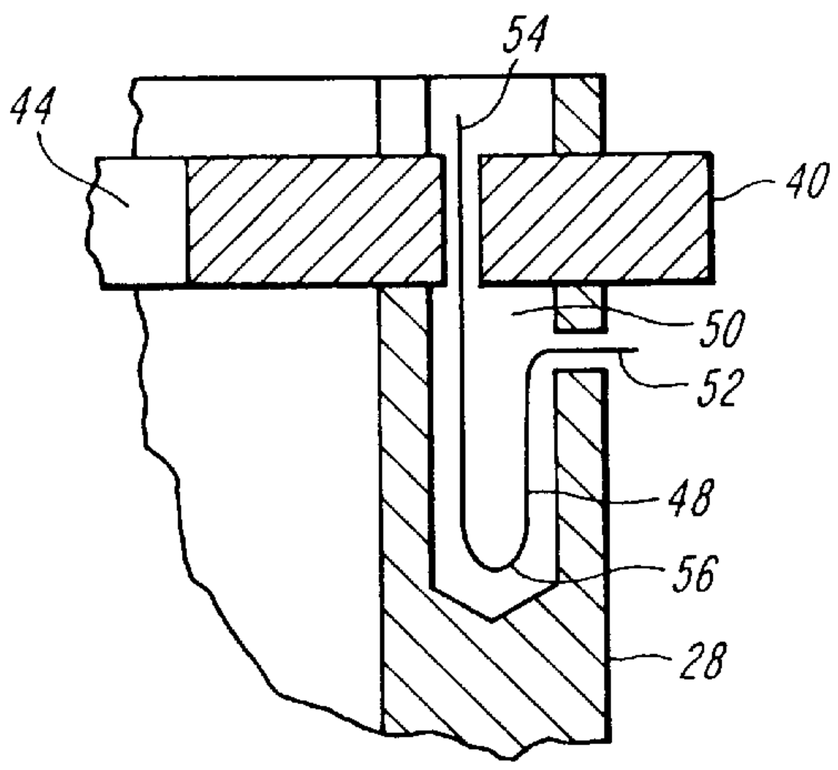

FIG. 4

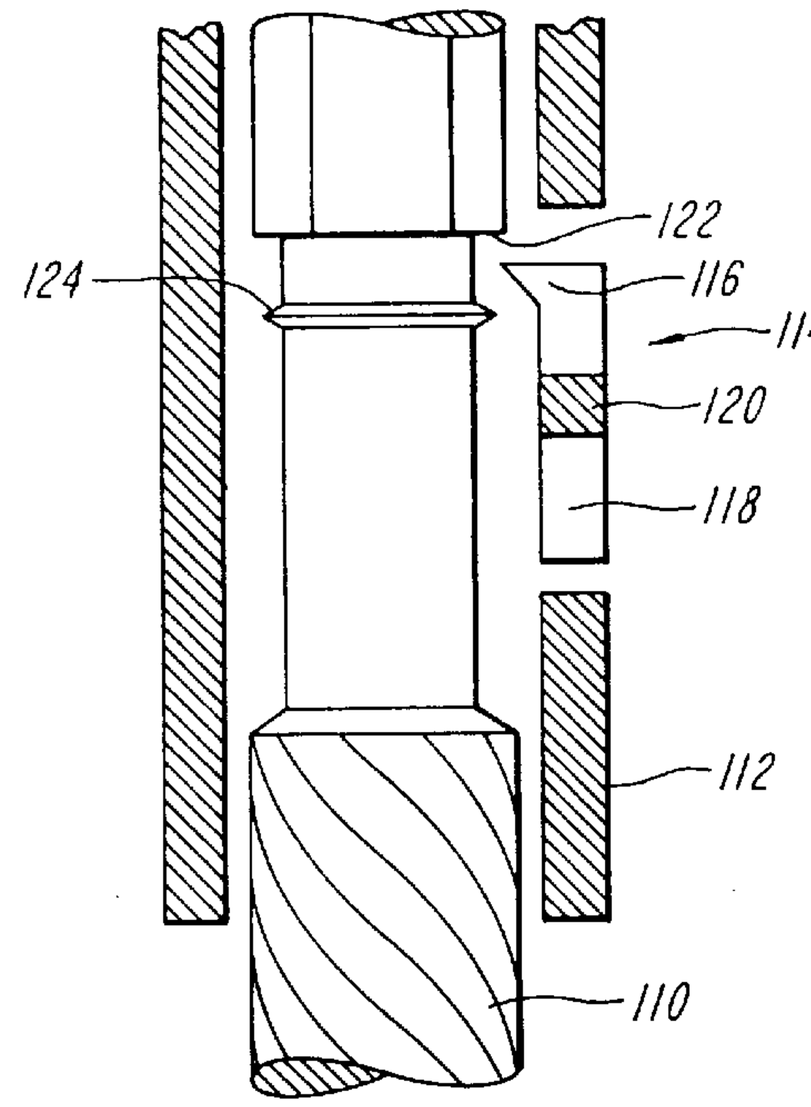

FIG. 5

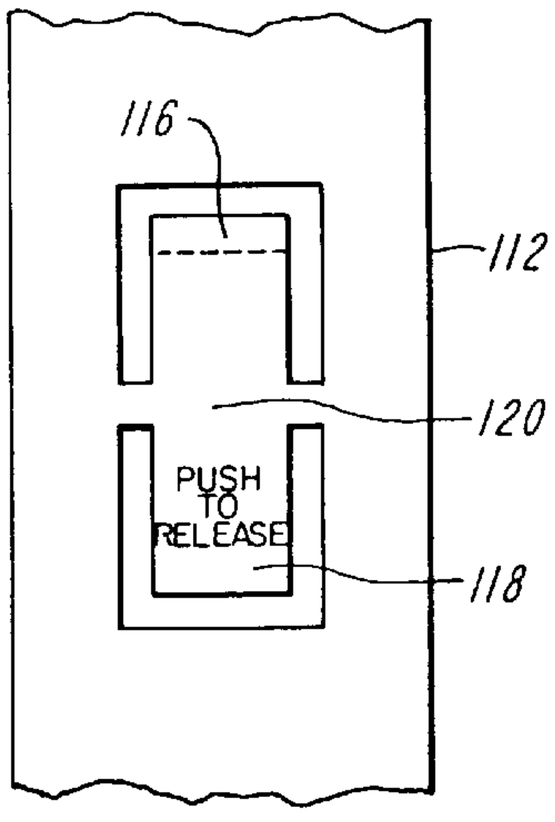

FIG. 6

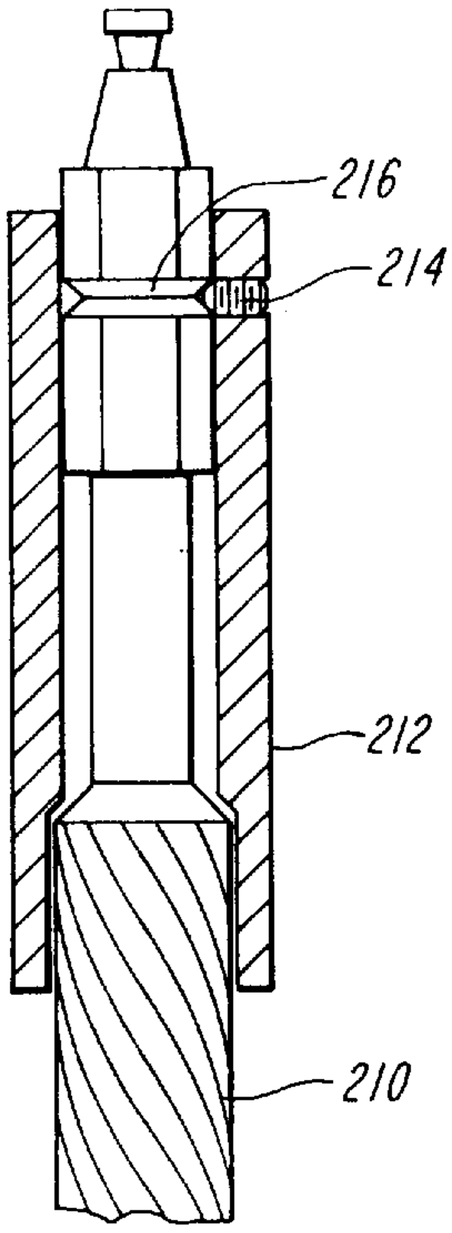

FIG. 7

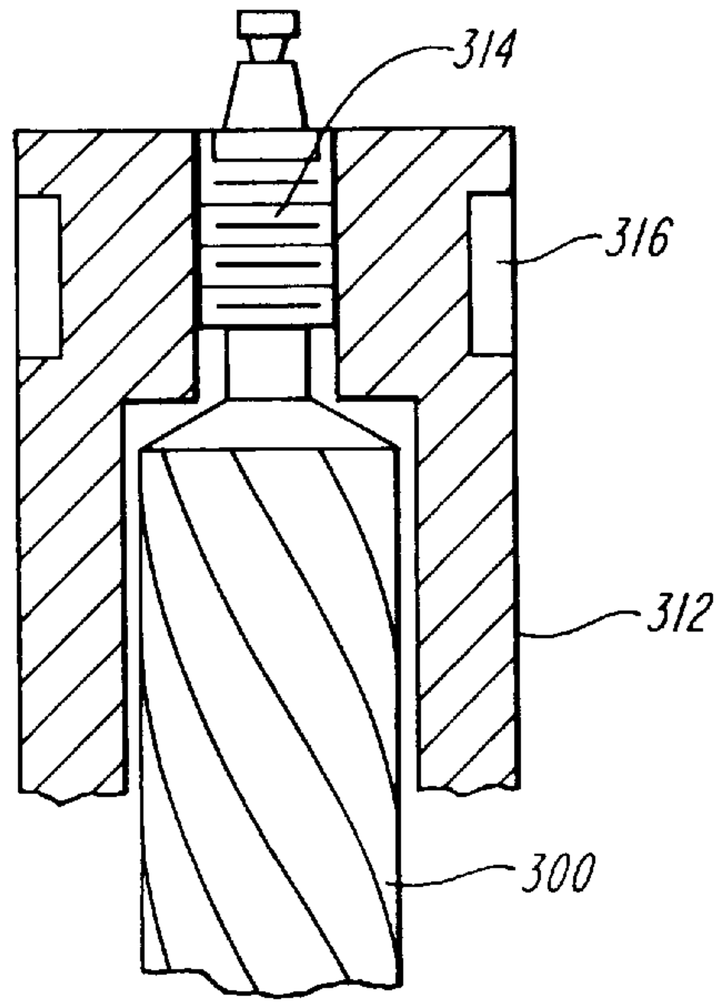

FIG. 8

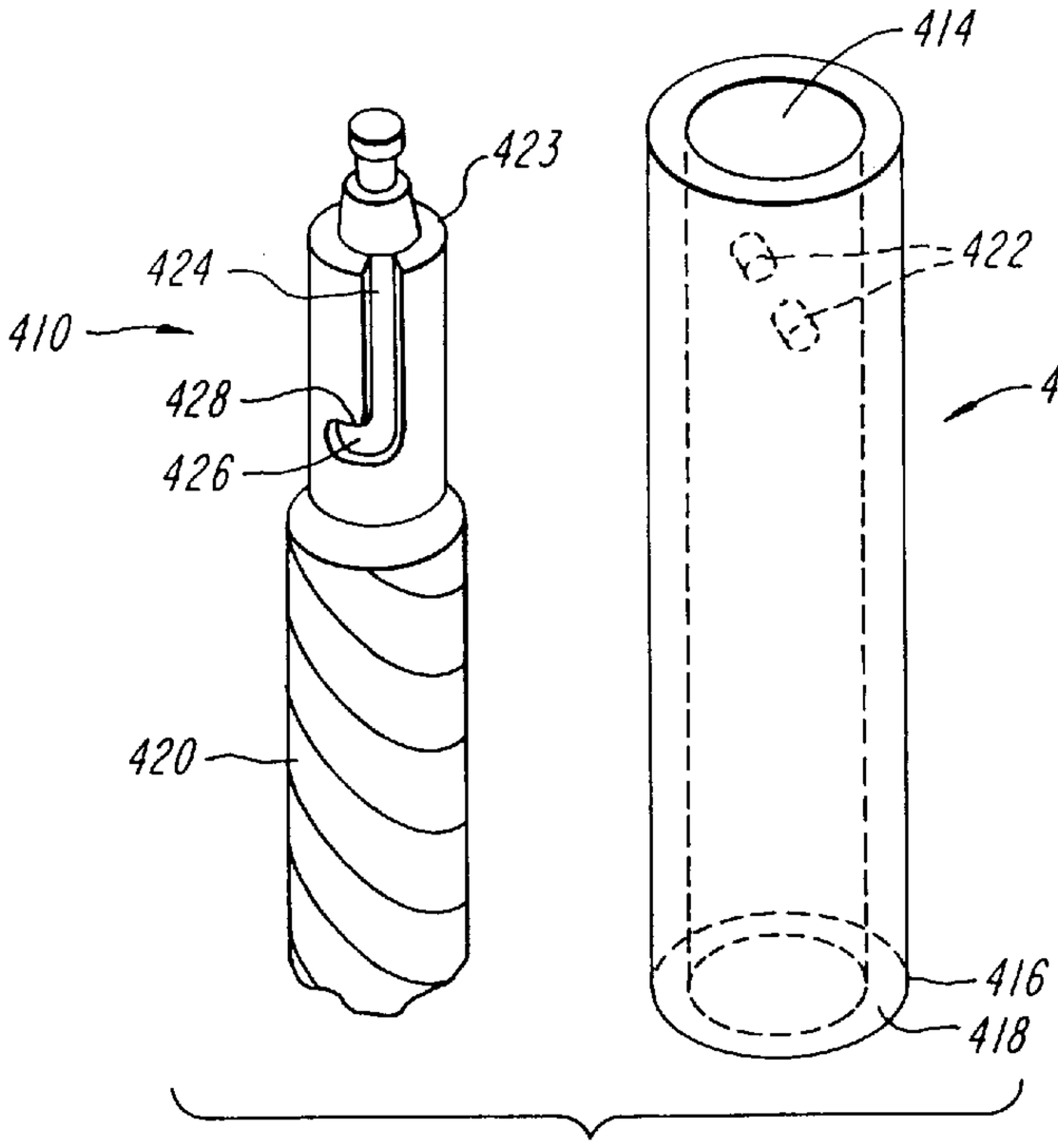

FIG. 9

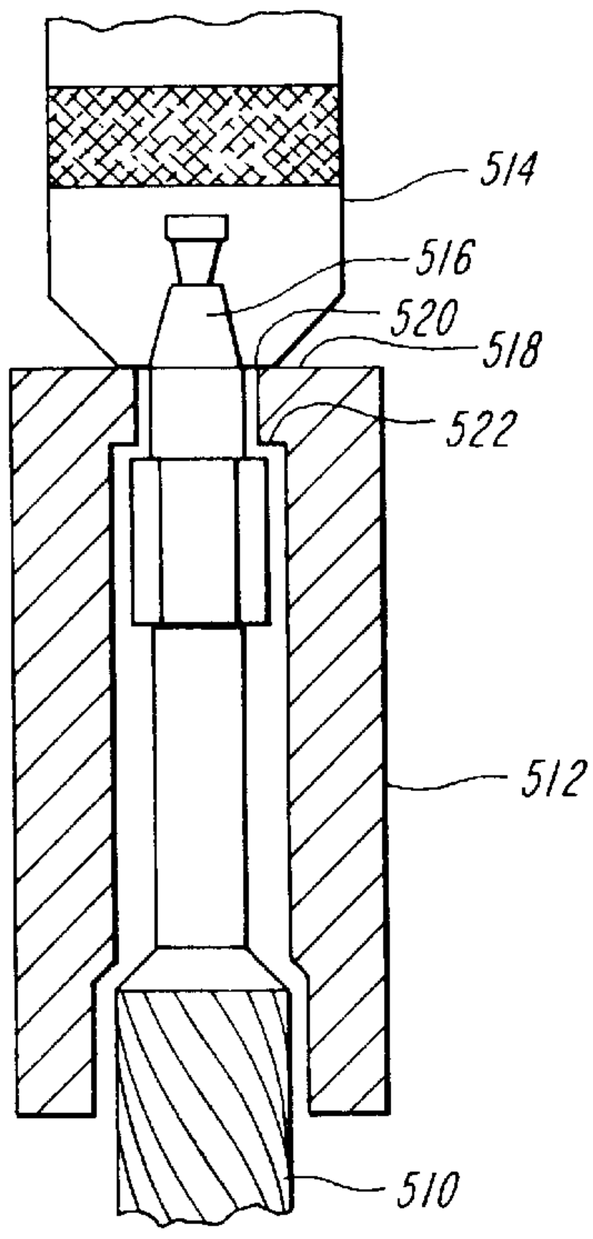

FIG. 10

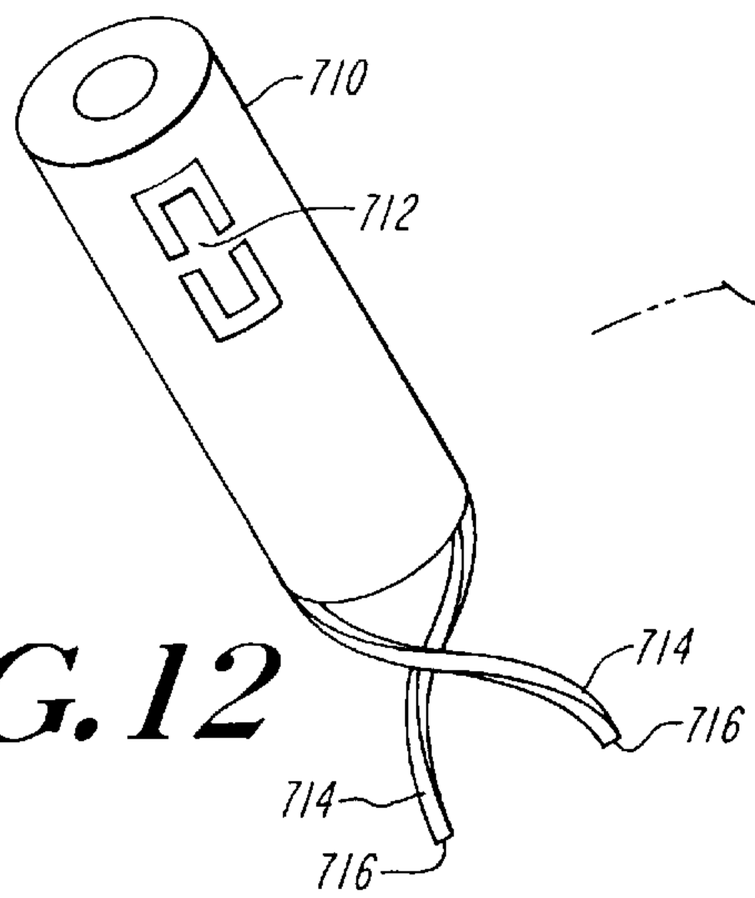

FIG. 12

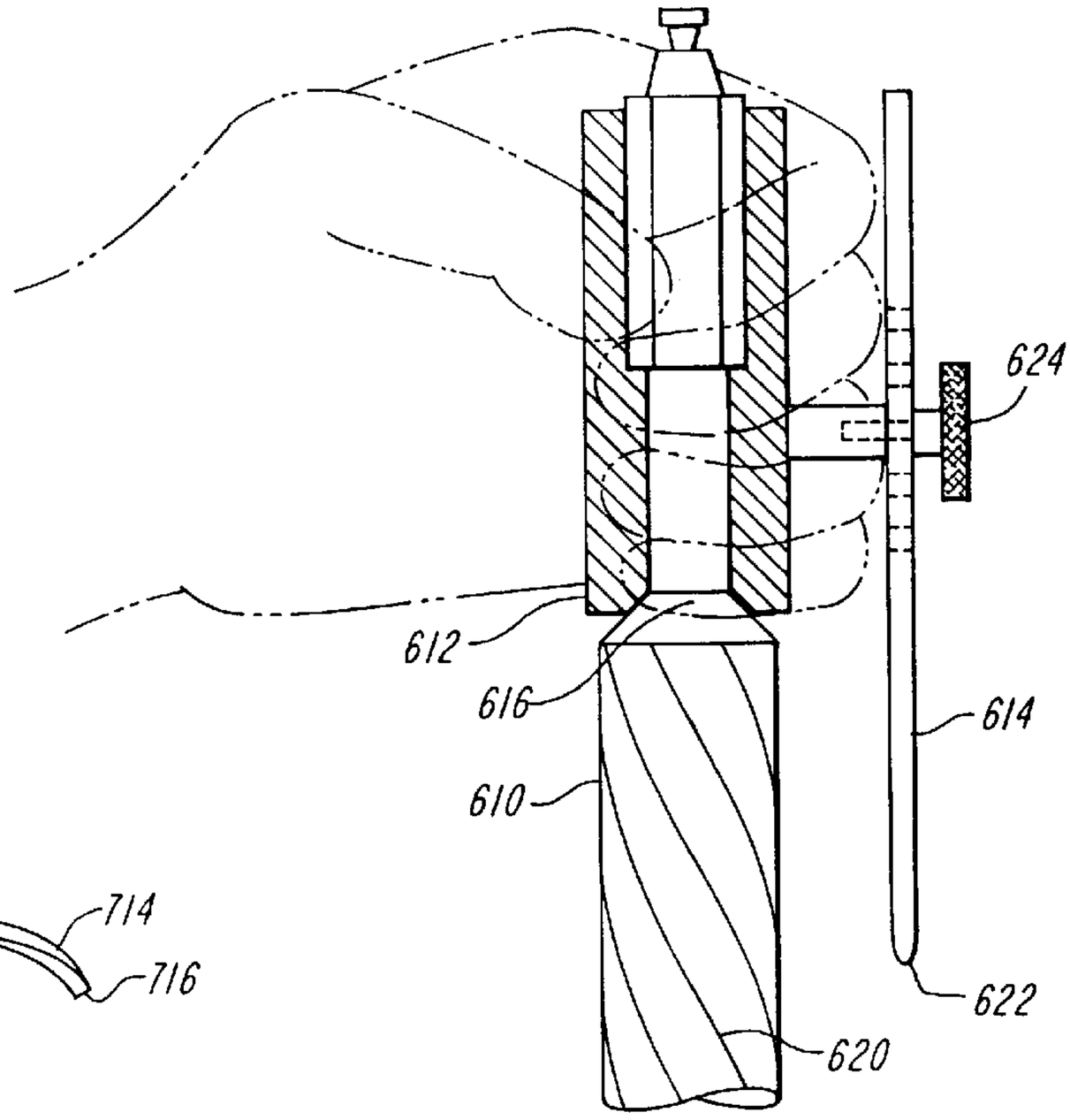

FIG. 11

LONG BONE REAMER WITH DEPTH STOP INDICATOR

CROSS-REFERENCE TO RELATED APPLICATIONS

Not Applicable.

STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH

Not Applicable.

FIELD OF THE INVENTION

The present invention relates to a instrument for reaming a long bone, in particular, a reaming instrument having a depth stop indicator.

BACKGROUND OF THE INVENTION

Orthopaedic surgeons must develop openings or cavities in long bones for a variety of reasons including fracture fixation and the implantation of stem based prostheses. Stems are used in prosthetic joint implants to anchor the prosthesis in a bone cavity. The bone receiving the stem is typically prepared by drilling a hole in the bone and creating an opening sized and contoured to receive the stem of the implant. The stem is inserted into a prepared cavity of a bone and a joint bearing surface attached or coupled to the stem, extends out to the cavity. An example of the preparation of a long bone for receipt of a femoral stem component of a total hip prosthesis is illustrated in U.S. Pat. No. 4,790,852 to Noiles which is hereby incorporated by reference.

When preparing a long bone for receipt of a stem, it is important to ream the bone to a suitable predetermined depth. Removal of more healthy bone than is necessary for implantation is always undesirable, and removal of too much or too little bone could result in an ill-fitted prosthesis. Orthopaedic surgeons use a variety of methods for indicating a predetermined reaming depth on a long bone reaming tool. Some surgeons simply mark the desired depth on the reamer with a pen so that the surgeon will know that the proper depth has been reached when the marking reaches the leading edge of the bone being reamed. This method has the disadvantage that markings can often be removed from the reamer by contact with body tissues or fluids during the reaming process.

Some orthopaedic instrumentation manufacturers have tried to improve depth markings on reamers by providing grooves transverse to the length of the reamer to provide a visual indicator to the surgeon similar to those made by pen. There are disadvantages to this approach as well. Transverse grooves may structurally weaken the reamer, shortening its useful life and possibly causing the reamer to fail during surgery. Additionally, the same reamer may be used to ream to a variety of different depths depending on the size of the stem being implanted. As a result, a large number of reamers each having a different depth marking must be maintained, resulting in an undesirable increase in instrument inventory. Alternatively, reamers must have multiple depth markings, which may result in confusion during reaming as to which is the correct depth mark.

Accordingly, it is an object of the present invention to provide a means for positively indicating a predetermined depth for a reamer while avoiding the aforementioned disadvantages.

SUMMARY OF THE INVENTION

The present invention provides an orthopaedic instrument system and method for reaming a long bone. The instrument

system includes an elongate reamer having a proximal portion and a bone contacting surface with an integral cutting element. A stop indicating sleeve having an axial bore and a stop indicating element is removably disposed about the reamer. During reaming, when the reamer reaches a predetermined reaming depth, the stop indicating element indicates to the surgeon that the desired depth has been reached.

In one embodiment, the stop indicating sleeve is provided with a stop element and a distal bone contacting surface. When the distal bone contacting surface contacts a portion of the long bone not reamed by the reamer, continued reaming forces the stop indicating sleeve proximally and urges the stop element on the sleeve into engagement with a stop engaging element provided on the reamer. The stop member may be selectively movable between a first, disengaged position in which the stop member does not engage the stop engaging member on the reamer, and a second, engaged position wherein the stop member engages the stop engaging member to prevent proximal motion of the stop indicating sleeve relative to the reamer.

Alternatively, proximal motion of sleeve with respect to the reamer may itself be a stop indication, alerting the surgeon that the predetermined reaming depth has been reached. In another embodiment, the sleeve may include a visual stop indicating element having a diameter no greater than the diameter of the reamer. In one example, this embodiment may include at least one leg sized to fit within a flute in the reamer and having a length such that when the distal end of the leg has reached the edge of the long bone being reamed, the predetermined reaming depth has been reached.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be more fully understood by reference to the following detailed description when considered in conjunction with the accompanying drawings, in which:

FIG. **1** illustrates a long straight reamer useful with the orthopaedic system of the invention;

FIG. **2** illustrates, partly in section, an orthopaedic reaming system of the invention having a straight reamer and a stop indicating sleeve;

FIG. **3**A is a cross sectional view of the orthopaedic reaming system of FIG. **2** taken along line **3**—**3** with a stop element in a first position;

FIG. **3**B is a cross sectional view of the orthopaedic reaming system of FIG. **2** taken along line **3**—**3** with the stop element in a second position;

FIG. **4** illustrates a bias member used with the stop indicating sleeve of FIG. **2**;

FIG. **5** illustrates an additional orthopaedic reaming system of the invention having a stop indicating sleeve with a biased lever member;

FIG. **6** is a side view of the biased lever member used in the system of FIG. **5**;

FIG. **7** illustrates an additional orthopaedic reaming system of the invention having a stop indicating sleeve with a detent member;

FIG. **8** illustrates an additional orthopaedic reaming system of the invention having a stop indicating sleeve in threaded engagement with a reamer;

FIG. **9** illustrates an additional orthopaedic reaming system of the invention including a stop indicating sleeve having a slot and pin engagement with a reamer;

FIG. **10** illustrates an additional orthopaedic reaming system of the invention having a stop indicating sleeve that contacts a tool chuck;

FIG. **11** illustrates an additional orthopaedic reaming system of the invention including a stop indicating sleeve having an attached rod; and

FIG. **12** illustrates a stop indicating sleeve useful with the invention having at least one stop indicating leg.

DETAILED DESCRIPTION OF THE INVENTION

A reamer **10** suitable for reaming a long bone and suitable for use with the orthopaedic instrument system of the invention is illustrated in FIG. **1**. The reamer is generally cylindrical and elongate with a bone contacting surface **12** having one or more bone cutting edges **14**. The illustrated reamer **10** has a plurality of flutes **16** arranged in a helical pattern with sharp edges **14** that are capable of cutting bone. Reamer **10** has a guide tip **18** on its distal end that may be used to guide the reamer **10** to a predrilled portion of the long bone. Reamer **10** is a straight reamer, though other reamer configurations may be used with the invention by a person of ordinary skill in the art.

Reamer **10** has a proximal portion **20** having a shaft **22** and tool mating elements on the shaft that may include a chuck engaging element **24** for cooperating with an instrument such as a power tool or drill to drive the reamer or a manual tool such as a T-handle, and a wrench engaging element **26** to allow a surgeon to drive the reamer **10** with a hand tool such as a wrench or socket.

An orthopaedic instrument system of the invention including reamer **10** and a stop indicating sleeve **28** is shown in FIG. **2**. Stop indicating sleeve **28** may be selected from a group of interchangeable sleeves having varying lengths, is generally cylindrical, and has axial bore **30** extending therethrough. The distal end **32** of the stop indicating sleeve **28** has a bone contacting distal surface **34**. Reamer **10** fits within the axial bore **30** of the stop indicating sleeve **28** so that the distal end **32** of the sleeve extends around a portion of the bone contacting surface **12** of the reamer, while at least a portion of the proximal portion **20** of the reamer extends through the bore **30**. Reamer **10** may fit within the axial bore **30** so that reamer **10** can rotate independently of the sleeve **28**. This allows the surgeon to grasp the sleeve **28** during reaming if desired, and also avoids opportunities for a spinning sleeve to contact body tissue around the reaming area.

The axial bore **30** may include a ledge **36** that engages a feature on reamer **10**, such as the proximal end **38** of the bone contacting surface **12**, to prevent the stop indicating sleeve **28** from sliding distally off the reamer **10**.

The stop indicating sleeve **28** includes a stop element **40** that engages a stop engaging element **42** on reamer **10** to prevent the sleeve from sliding in a proximal direction relative to the reamer. As shown in FIGS. **2**, **3**A and **3**B, stop element **40** is a biased sliding member with an aperture **44**. Pressing on an extending portion **46** of the stop element **40** deforms bias member **48** and aligns the aperture **44** with at least a portion of the axial bore **30** of stop indicating sleeve **28** (FIG. **3**A) and centers the aperture **44** with respect to the shaft **22** on the reamer **10**. With the stop element **40** in this first position, the stop indicating sleeve **28** can slide over the proximal portion **20** of the reamer **10** and be fully disengaged from the reamer.

Releasing the stop element **40** and allowing the bias element **48** to return to its unbiased position causes the aperture **44** on the stop element **40** to become offset with respect to the reamer shaft **22** (FIG. **3**B). In this second position, a proximal surface of stop element **40** adjacent to aperture **44** engages the stop engaging element **42** on the reamer **10**. As shown in FIG. **2**, the stop engaging element **42** may be the distal end of the wrench engaging element **26**. A person of ordinary skill in the art will readily recognize that other stop engaging elements can be provided on the reamer **10** to engage the stop element **40** to prevent the stop indicating sleeve from sliding toward the proximal end **20** of reamer **10**.

Bias element **48**, illustrated in FIG. **4**, is formed of a resilient material and can be located within a bore **50** in the body of stop indicating sleeve **28**. The bias element **48** has a first end **52** that engages the body of the stop indicating sleeve **28**, a second end **54** that engages the stop element **40**, and at least one curve **56** provided between the first and second ends in a configuration that allows the bias element **48** to bias the sliding stop element **40** toward the second of the first and second positions illustrated in FIGS. **3**A and **3**B respectively.

The reamer and stop indicating sleeve of the invention may be used to ream any long bone. In particular, the instruments of the invention are useful for reaming long bones such as the femur, tibia or humerus for receipt of a stem based prosthesis. Reamer **10** may be made from any material useful for bone cutting applications and may, for example, be made of heat treated stainless steel. Reamer **10** generally varies in length from about 90 to 300 millimeters; for primary hip stem implantation into a femur, the length will vary from about 120 to 160 mm. Typically, the desired reaming depth will be equal to, or slightly longer than the length of the stem being implanted in the long bone.

An instrument set of the invention may include reamers of a single predetermined length, such as 260 or 300 mm, which would be long enough for even the longest of revision hip stems, and a variety of cutting diameters (generally 6 to 21 mm for most applications). Alternatively, a small number of different length reamers could be provided for different applications, e.g., a reamer length for hip revision surgery, a reamer length for primary hip surgery, a reamer length for tibial implant surgery, etc. A number of stop indicating sleeves can then be provided to adjust the effective reamer length to the desired value.

For example, to ream a femur to receive a hip stem having a length of 160 mm and a diameter of 19 mm given a set of 260 mm length reamers, a surgeon would choose the 19 mm diameter reamer **10**, and a stop indicating sleeve **28** that would limit the effective reaming length to 160 mm. Such a stop indicating sleeve **28** would cover 100 mm of the reaming surface **12** of the reamer **10** when disposed on the reamer **10** so that the stop member **40** is in contact with the stop engaging element **42**. The surgeon would then manually engage the stop element **40** by pressing on the extending portion **46** to align the aperture **44** with the axial bore **30** of the sleeve **28**, and sliding the stop indicating sleeve **28** over the proximal end **20** of reamer **10**.

Reamer **10** could then be employed, for example, to ream the medullary canal of the proximal femur of a patient. An example of such reaming using conventional instrumentation is illustrated in FIG. 4 of U.S. Pat. No. 4,790,852. In this example, following proximal femur resection, the surgeon may use reamer **10**, having stop indicating sleeve **28** disposed thereon as described above, to ream the canal until the distal bone-contacting end **34** of the stop indicating sleeve **28** contacts the resected portion of the femur around the reamed hole. When the distal bone-contacting end **34** contacts the femur, the stop indicating sleeve **28** is forced toward the proximal end **20** of reamer **10**, and the stop

element **40** engages the stop engaging element **42** on the reamer **10** to prevent further proximal motion. The stop indicating sleeve **28** thus positively prevents reamer **10** from moving any deeper into the femur.

Another orthopaedic instrument system of the invention, illustrated in FIGS. **5** and **6**, includes reamer **110** and stop indicating sleeve **112**. Sleeve **112** has a biased lever element **114** including a stop element **116**, a release element **118**, and a sleeve connecting element **120**. Biased lever element **114** is resiliently connected to sleeve **112** and is biased to a stop engaging position wherein stop element **116** engages a stop engaging element **122** on reamer **110** to prevent motion in a proximal direction. The stop engaging position is released by pressing on the release element **118** of the biased lever **114** to disengage stop element **116** from stop engaging element **122**. A circumferential protrusion **124**, or a plurality of such protrusions, may also be provided on reamer **110** to engage stop element **116** to prevent sleeve **112** from sliding distally with respect to reamer **110**.

An additional orthopaedic reaming system of the invention having reamer **210** and stop indicating sleeve **212** is shown in FIG. **7**. Sleeve **212** includes a detent member **214** which may be a set screw, a biased detent member such as a spring ball, or another detent member that may be selected by a person of ordinary skill in the art. As shown, detent member **214** engages a groove **216** as a stop engaging member on reamer **210**, however, detent member **214** may engage other features of the reamer to prevent distal motion of sleeve **212** as well.

FIG. **8** illustrates an orthopaedic reaming system of the invention having a reamer **310** threadedly engaged with a stop indicating sleeve **312**. In this configuration, the threading **314** on the reamer **310** and sleeve **312** will be in the opposite direction of the rotation of the reamer for the purpose of reaming bone. That is, if a right-hand rotation is used to cut bone, threads **314** will be left-handed. Wrench engaging features **316** may also be provided on sleeve **312** to facilitate the threaded engagement with the reamer **310**.

An additional reamer **410** and stop indicating sleeve **412** of the orthopaedic reaming system of the invention are illustrated in FIG. **9**. Sleeve **412** is generally cylindrical with an axial bore **414** and a distal end **416** having a bond contacting surface **418**. The axial bore **414** is sized so that the distal portion of the sleeve **412** fits over the bone contacting surface **420** of reamer **410**. Sleeve **412** further includes a stop element in the form of two pins **422** formed within axial bore **414**. Of course, a person of ordinary skill in the art may use more or fewer stop elements as the circumstances of a particular instrument require. Longitudinal slots **424** (one shown) slidingly receive pins **422** to allow the sleeve **412** to slide over the proximal portion **423** of reamer **410**. A transverse slot **426**, preferably extending in a direction opposite to the direction of rotation of reamer **410**, communicates with the distal end of longitudinal slot **424**. After sliding sleeve **412** over the proximal portion **423** of reamer **410**, twisting the sleeve **412** with respect to reamer **410** fully engages pins **422** with transverse slots **426**. When so engaged, the proximal wall **428** of slot **426** becomes a stop engaging element for pins **422** and prevents reamer **410** from being deployed more deeply than desired in a patient's long bone.

As shown in FIG. **10**, an orthopaedic reaming instrument of the invention may have reamer **510**, sleeve **512** and chuck **514** engaged to the proximal end **516** of the reamer. In this configuration, the proximal portion **518** of sleeve **512** abuts the distal portion **520** of chuck **514** to prevent proximal movement of the sleeve with respect to reamer **510** and chuck **514** acts as a stop engaging element. In addition, step **522** may be provided on the sleeve to engage a feature of reamer **510** to prevent distal movement of the sleeve with respect to the reamer. In this way, a rigid connection between reamer **510**, sleeve **512** and chuck **514** may be achieved.

Reaming systems of the invention may also provide visual stop indications in addition to or in place of physical stop indications. For example, using reamer **10** and stop indicating sleeve **28** (FIG. **2**), when ledge **36** on the sleeve rests on the proximal end **38** of the bone contacting surface **12** of reamer **10**, a gap exists between stop element **40** and stop engaging element **42**. During reaming, the distal bone contacting surface **34** of sleeve **28** will contact the bone being reamed and this contact moves sleeve **28** proximally with respect to the reamer **10** until stop element **40** and stop engaging element **42** make contact. This relative movement provides a visual indication to the surgeon that the physical stop is about to be reached. Further, sleeve **28** could be configured without stop element **40**. Such a sleeve could readily be configured to provide a visual indication at the predetermined reaming depth rather than shortly before the predetermined reaming depth.

An additional orthopaedic reaming system of the invention using a visual stop indication, illustrated in FIG. **11**, includes reamer **610**, sleeve **612**, and rod **614**. Sleeve **612** slides over the proximal end **616** of reamer **610** and abuts the proximal edge **618** of the bone contacting surface **620** of reamer **610** to prevent the sleeve from sliding in a distal direction. A surgeon may hold the sleeve **612** in contact with a proximal edge **618** by holding the sleeve **612** and applying a slight distal pressure.

Rod **614** has a distal, bone contacting end **622** so that when reaming has reached the desired depth, the distal, bone contacting end **622** of rod **614** contacts unreamed bone and causes sleeve **612** to slide proximally with respect to reamer **610** giving the surgeon a visual indication that the desired depth has been reached. Rod **614** may be slidably attached to sleeve **614**, for example, using thumb screw **624**, so that the rod **614** may be adjusted for different desired reaming depths. Rod **614** may also have calibrated markings to allow more efficient adjustments to the desired reaming depth.

An additional stop indicating sleeve **710** having a visual stop indication is shown in FIG. **12**. Sleeve **710** includes a biased lever element **712**, similar in structure and operation to biased lever element **114** (FIGS. **5** and **6**), and at least one leg **714** configured to fit within a reamer flute so that the reamer assembly, including sleeve **710**, has a diameter that is no greater than the diameter of the reamed hole. This configuration is advantageous where the bone being reamed does not have a clear bone surface around the desired reaming position. The legs **714** are sized to fit within reamer flutes and indicate that the desired reaming depth has been reached when the distal ends **716** of legs **714** reach the edge of the bore being reamed.

It will be understood that the foregoing is only illustrative of the principles of the invention, and that various modifications of the disclosed orthopaedic reaming system, including combining features of the various disclosed embodiments, can be made by those skilled in the art without departing from the scope and spirit of the invention. All references cited herein are expressly incorporated by reference in their entirety.

What is claimed is:

1. An orthopedic instrument system for reaming a long bone comprising:

a fixed length elongate reamer having a proximal portion, a bone contacting outer surface, at least one bone cutting element integral with the bone contacting outer surface, and a single stop engaging element disposed thereon; and

a stop indicating sleeve comprising a substantially cylindrical sleeve defining an axial bore, the sleeve being removably disposed about the elongate reamer and having a bone contacting distal end and a stop element, the stop element being selectively movable between a first, disengaged position in which the stop element does not engage the stop engaging element on the reamer, and a second, engaged position wherein the stop element engages the stop engaging element to prevent proximal motion of the stop indicating sleeve relative to the reamer;

wherein the stop element is biased to the second, engaged position; and

wherein, at a predetermined reaming depth, the bone contacting distal end of the sleeve contacts a portion of the long bone not reamed by the elongate reamer and the stop element on the sleeve engages the stop engaging element disposed on the reamer to prevent the reamer from reaming the long bone further than the predetermined reaming depth.

2. The orthopaedic instrument system of claim **1**, wherein the stop element comprises a sliding member.

3. The orthopaedic instrument system of claim **2**, wherein the stop element includes an aperture that is at least partially aligned with the axial bore of the stop indicating sleeve.

4. The orthopaedic instrument system of claim **3**, wherein a surface of the stop element adjacent the aperture contacts the stop engaging element when the stop element is in its second position.

5. The orthopaedic instrument system of claim **1**, wherein the stop engaging element is integral with the proximal portion of the reamer.

6. The orthopaedic instrument system of claim **1**, wherein the stop engaging element is provided on a power tool connecting element engaged with the proximal portion of the reamer.

7. The orthopaedic instrument system of claim **1**, wherein the stop element comprises a biased lever.

8. The orthopaedic instrument system of claim **1**, wherein the stop element comprises a detent element.

9. The orthopaedic instrument system of claim **8**, wherein the detent element is biased to the second, engaged position.

10. The orthopaedic instrument system of claim **9**, wherein the detent element is a spring ball.

11. The orthopaedic instrument system of claim **8**, wherein the detent element is a set screw.

12. The orthopaedic instrument system of claim **1**, wherein the stop indicating sleeve is in a threaded engagement with the reamer.

13. The orthopaedic instrument system of claim **1**, wherein the bone contacting distal end of the stop indicating sleeve is provided on an attached rod.

14. The orthopaedic instrument system of claim **13**, wherein the attached rod is adjustable to change the effective reaming depth of the system.

15. An orthopedic instrument system for reaming a long bone comprising:

an elongate reamer having a proximal portion, a bone contacting outer surface, at least one bone cutting element integral with the bone contacting outer surface, and a stop engaging element disposed thereon; and

a stop indicating sleeve comprising a substantially cylindrical sleeve defining an axial bore, the sleeve being removably disposed about the elongate reamer and having a bone contacting distal end and a stop element;

wherein, at a predetermined reaming depth, the bone contacting distal end of the sleeve contacts a portion of the long bone not reamed by the elongate reamer and the stop element on the sleeve engages the stop engaging element disposed on the reamer to prevent the reamer from reaming the long bone further than the predetermined reaming depth;

wherein the stop indicating sleeve includes at least one pin engageable within at least one slot provided on the proximal portion of the reamer; and

wherein the at least one slot provided on the proximal portion of the reamer has a longitudinal portion and a transverse portion.

16. The orthopaedic instrument system of claim **15**, wherein the transverse portion is oriented in a direction opposite to a direction of reaming rotation of the reamer.

17. An orthopedic instrument kit for reaming a long bone comprising:

a fixed length elongate reamer having a proximal portion, a bone contacting outer surface, and at least one bone cutting element integral with the bone contacting outer surface; and

a plurality of fixed length interchangeable stop indicating sleeves engageable with the reamer, each sleeve having a different length and comprising a substantially cylindrical sleeve defining an axial bore removably disposed about the elongate reamer and a stop indicating element;

wherein, for a stop indicating sleeve selected from the plurality of stop indicating sleeves for reaming to a predetermined reaming depth engaged with the fixed length reamer, the stop indicating element indicates that the reamer has reached the predetermined depth.

18. The orthopaedic reaming system of claim **17**, wherein the stop indicating element includes a distal bone contacting end that causes relative motion between the stop indicating sleeve and reamer upon contact with an unreamed surface of the long bone.

19. The orthopaedic reaming system of claim **18**, wherein when the distal bone contacting end contacts an unreamed surface of the long bone, a stop element provided on the stop indicating sleeve engages a stop engaging element on the reamer to provide a physical stop indication.

20. The orthopaedic reaming system of claim **18**, wherein the distal bone contacting surface is provided on a rod attached to the stop indicating sleeve that is adjustable to effect the predetermined reaming depth of the system.

21. The orthopaedic reaming system of claim **17**, wherein the stop indicating element is a visual stop indicating element that has a diameter no larger than a diameter of a bone contacting portion of the reamer.

22. The orthopaedic reaming system of claim **21**, wherein the stop indicating element comprises at least one leg member sized to fit within a flute on the reamer.

23. A method for reaming a long bone to a predetermined depth comprising the steps of:

providing an elongate reamer having a proximal portion, a bone contacting outer surface, at least one bone cutting element integral with the bone contacting outer surface;

providing a plurality of fixed length interchangeable stop indicating sleeves, each sleeve having a different length, comprising a substantially cylindrical sleeve defining an axial bore removably disposed about the elongate reamer and a stop indicating element;

selecting a stop indicating sleeve having a desired length corresponding to a predetermined reaming depth for the reamer;

engaging a long bone with the reamer to create a bore within the bone of increasing depth wherein, at a predetermined reaming depth, the stop indicating element indicates that the predetermined depth has been reached; and

ceasing increasing the depth of the reamed bore and disengaging the reamer from the long bone.

24. The reaming method of claim **23**, wherein the stop indicating element includes a distal bone contacting end that causes relative motion between the stop indicating sleeve and reamer upon contact with an unreamed surface of the long bone.

25. The reaming method of claim **24**, wherein when the distal bone contacting end contacts an unreamed surface of the long bone, a stop element provided on the stop indicating sleeve engages a stop engaging element on the reamer to provide a physical stop indication.

26. The orthopaedic reaming system of claim **23**, wherein the stop indicating element is a visual stop indicating element that has a diameter no larger than a diameter of a bone contacting portion of the reamer.

27. The orthopaedic reaming system of claim **26**, wherein the stop indicating element comprises at least one leg member sized to fit within a flute on the reamer.

28. The orthopedic instrument kit of claim **20**, wherein the stop indicating element comprises a stop element selectively movable between a first, disengaged position in which the stop element does not engage a stop engaging element on the reamer, and a second, engaged position wherein the stop element engages the stop engaging element to prevent proximal motion of the stop indicating sleeve relative to the reamer.

29. The orthopedic instrument kit of claim **28**, wherein the stop element is biased to the second, engaged position.

30. The orthopaedic instrument kit of claim **28**, wherein the stop element comprises a sliding member.

31. The orthopaedic instrument kit of claim **30**, wherein the stop element includes an aperture that is at least partially aligned with the axial bore of the stop indicating sleeve.

32. The orthopaedic instrument kit of claim **31**, wherein a surface of the stop element adjacent the aperture contacts the stop engaging element when the stop element is in its second position.

33. The orthopaedic instrument kit of claim **28**, wherein the stop engaging element is integral with the proximal portion of the reamer.

34. The orthopaedic instrument kit of claim **28**, wherein the stop engaging element is provided on a power tool connecting element engaged with the proximal portion of the reamer.

35. The orthopaedic instrument kit of claim **28**, wherein the stop element comprises a biased lever.

36. The orthopaedic instrument kit of claim **28**, wherein the stop element comprises a detent element.

37. The orthopaedic instrument kit of claim **36**, wherein the detent element is biased to the second, engaged position.

38. The orthopaedic instrument kit of claim **37**, wherein the detent element is a spring ball.

39. The orthopaedic instrument kit of claim **36**, wherein the detent element is a set screw.

40. The orthopaedic instrument kit of claim **17**, wherein the stop indicating sleeve is in a threaded engagement with the reamer.

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